File

4 March 1963

MEMORANDUM FOR: Assistant for Plans and Development

THROUGH : Executive Secretary, TDC

SUBJECT : Staff Study - Modification of Contract [redacted] 25X1A
[redacted] to Provide a Technical Change at 25X1A
Increased Cost

1. PROBLEM:

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To negotiate a contract change in the amount of approximately [redacted] to provide a technical change increasing the maximum resolution of the prototype model from 20 lines per millimeter to 50 lines per millimeter. 25X1A

2. FACTS BEARING ON THE PROBLEM:

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a. The current cost plus fixed fee contract [redacted] is to provide a prototype model of photographic change detector at a maximum resolution level of 20 lines per millimeter. Photographic imagery is currently available having resolutions considerably above the 20 lines per millimeter limitation of the equipment.

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b. A study [redacted] has shown feasibility of increasing the capability to 50 lines per millimeter. (See enclosure #1)

3. ASSUMPTIONS:

a. High resolution readout by electronic means will be required for many image analysis devices in the near future.

b. It will be more economical to incorporate this improvement now in the fabrication of the prototype than to change the prototype after it is completed.

4. DISCUSSION:

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a. [redacted] that the resolution of the Change Detector (20 lines/mm) was so low as to seriously limit its usefulness. This resulted in an investigation [redacted] to determine the feasibility of increasing the resolution and how much. Studies were also made in the areas of: cathode ray tube, power supply regulation and ripple requirements, dynamic focus requirements, optical focus requirements and registration accuracy. 25X1A

b. On 29 January 1963 [redacted] submitted a letter 25X1A
report in which it is shown feasible to increase the resolution of the Change Detector to 50 optical line pairs per millimeter. It is further shown that the objectional cathode ray tube raster lines appearing in the present design can be eliminated by introducing a "spot wobble" or raster line suppression.

c. The current design of the Change Detector provides a 70mm frame scan at 6 to 7 lines/mm for change detection. This image is displayed on two 14 inch TV screens one of which will show the unaltered scene, the other will exhibit the changes that have occured, provided they can be resolved at 6 lines/mm. Should they be too small to be resolved, a switch is made to 20 lines/mm and a reduced area is displayed at 40X magnification.

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d. This is the design objective that was approved by this Agency 15 June 1962 and funded in the amount of [redacted] The action was based on two assumptions: One, the experience gained in the development and evaluation of this Change Detector will provide the first actual experience in automatic change detection and will be of great value in considering further projects in the field of automatic photo interpretation aids. Two, the automatic correlation technique which is part of the Change Detector will provide knowledge and experience in automatic correlation which can be applied to other interpretation devices, which will surely have to be developed. To the best of my knowledge this is the first time any company has attempted building a device that will correlate automatically with four degrees of freedom. Three, if some degree of success can be obtained in automatic change detection, it will release the time and effort of the interpreter being spent on scanning great quantities of film for changes and let him devote his effort to studying the indicated changes.

e. In the proposed change the interpreter would still view the gross imagery at 6 lines per mm for change detection. On the one display he could apply all the normal interpreter techniques used in viewing on a light table, ignoring those changes which he could immediately recognize as other than man made. On the other display he would have the capability of displaying changes occuring in a .3" x .4" area on the film at 50 lines per mm. Although this is a long way from the film resolutions expected to be available in the near future, it is in the right direction.

f. The current spot size of the cathode ray tube is 0.001 inches. To obtain 50 lines per mm the spot size must be reduced to 0.0006 inches. This has already been accomplished in development type tubes. Other components that will require refinements are: regulation of the high voltage power supply, focus and control of the spot size over the entire face of the CRT, more accurate placement of optics and greater rigidity in the mechanical supporting elements, and better quality optics particularly as to flatness of optical surfaces. All of these refinements, although not absolutely required in the present design, would if embodied, produce a more reliable and useful piece of equipment.

5. CONCLUSIONS:

a. It is possible to increase the readout resolution of the Change Detector by a factor of 2.5 to 1.

b. The change will not effect the gross presentation of the instrument.

c. The change will not degrade the reliability of the instrument, but should in fact increase its reliability.

d. It will be possible to inspect any portion of the 70mm frame at the 50 line/mm resolution, if desired.

e. The increased resolution will save time of the interpreter since he will be able to make analysis of suspected areas on the instrument, (not requiring removal of the film for use on more powerful viewing devices to be certain of its content.)

f. The interpreter will be able to use shadow and cloud rejection techniques to eliminate noise when he is satisfied that the interested changes will not be clipped along with the unwanted signals.

g. The improved machine will provide greater accuracy in the total number of changes detected. In fact, it will show all changes falling within the 50 line/mm resolution limits of the instrument.

h. The additional cost [redacted] contract is a very modest amount to obtain an improvement in the order of 2.5 to 1. 25X1A

6. RECOMMENDATIONS:

a. It is recommended that a contract change be negotiated [redacted] 25X1A on Contract [redacted] to increase the readout capability of the Change Detector from 20 lines per millimeter to 50 lines per millimeter. The cost of this change to be approximately [redacted] 25X1A 25X1A

b. It is further recommended that the contract completion date of 15 March 1964 be extended by the required amount of time to provide for the additional work required by this change.

[redacted] 25X1A
Development Branch, PEDS

APPROVED: _____ Date
Executive Director, NPIC